AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Canceled)

2. (Canceled)

3. (Currently Amended) Method ~~according to claim 2, in which~~ for determining a contact force vector acting on a rolling element bearing in operation, the rolling element bearing comprising an inner ring, an outer ring and a number of rolling elements between the inner and outer ring, the method comprising:

receiving sensor signals from a plurality of sensors measuring performance characteristics of the rolling element bearing;

processing the received sensor signals to determine the contact force vector,

wherein the plurality of sensors are arranged to measure a bearing component deformation; and the step of processing comprises the step of determining the contact force vector using an inverse transformation of a finite element analysis model which describes the rolling element bearing;

the finite element analysis model is simplified using at least one generalised mode shape, the at least one generalised mode shape being a mathematical description of a natural mode deformation of a component of the rolling element bearing, such as the inner or outer ring; and

the simplified model has the form:

(1)

in which

(2) s (ω) is a set of measurement points where the deformations are measured at a frequency ω;

(3) T_m is a subset of a transformation matrix (4) T used for the calculation of a stiffness matrix K_P for the simplified model, the stiffness matrix $K_P = T\ K_{FEM}\ T$, K_{FEM} being a stiffness matrix of a finite element analysis model of the component;

p is the vector describing the deformation of the component;

θ is the co-ordinate in circumferential direction of the component;

α is the co-ordinate perpendicular to the component;

F is a set of shape functions as used for the simplified modeling of the component;

f_c is a vector comprising the contact forces working in points with co-ordinates stored in the vectors O and α; and

f_e is a vector comprising other forces acting on the component,

and the step of determining the contact force vector f comprises the step of solving the simplified model equations for f_c, O and α and summing the contact forces according to $f = f(f_c, O, \alpha)$.

4. (Original) Method according to claim 3, in which only the sensor signals at a rolling element pass frequency ω_{bp} are considered in the simplified model.

5. (Previously Presented) Method according to claim 3, in which the sensors are positioned at the same pitch as the rolling elements, and the simplified model takes the form of |S (abbe)| = Tm K p | fc (mbp)|,

and the step of determining the contact force vector f comprises the step of solving the simplified model equations for $|f_C|$ and α and summing the contact forces according to $f = f(f_c, \alpha)$.

6. (Previously Presented) Method according to claim 3, in which the number of sensors is equal to the number of rolling elements.

7. (Previously Presented) Method according to claim 3, in which the contact angle of the forces acting on the rolling element bearing is equal to a predetermined value, and the number of the plurality of sensors is equal to the number of loaded rolling elements.

8. (Canceled)

9. (Canceled)

10. (Currently Amended) Sensor arrangement according to claim **[[8]]** <u>17</u>, in which the bearing inner ring or outer ring are attached to a sensor holder, a circumferential recession being provided between at least part of the contacting surfaces of the inner ring or outer ring and the sensor holder.

11. (Previously Presented) Method according to claim 4, in which the sensors are positioned at the same pitch as the rolling elements, and the simplified model takes the form of $|\overline{s}(\omega_{bp})| = \overline{\overline{T}}_m \overline{\overline{K}}_p^{-1} \frac{\partial F(\overline{\theta},\overline{\alpha})}{\partial \overline{p}} |\overline{f}_c(\omega_{bp})|$

and the step of determining the contact force vector $\overline{f}$ comprises the step of solving the simplified model equations for $|\overline{f}_c|$ and $\overline{\alpha}$ and summing the contact forces according to $\overline{f} = f(\overline{f}_c, \overline{\alpha})$.

12. (Previously Presented) Method according to claim 4, in which the number of sensors is equal to the number of rolling elements.

13. (Previously Presented) Method according to claim 5, in which the number of sensors is equal to the number of rolling elements.

14. (Previously Presented) Method according to claim 4, in which the contact angle of the forces acting on the rolling element bearing is equal to a predetermined value, and the number of the plurality of sensors is equal to the number of loaded rolling elements.

15. (Previously Presented) Method according to claim 5, in which the contact angle of the forces acting on the rolling element bearing is equal to a

predetermined value, and the number of the plurality of sensors is equal to the number of loaded rolling elements.

16. (Canceled)

17. (Previously Presented) Sensor arrangement for determining a contact force vector acting on a rolling element bearing in operation, the rolling element bearing comprising an inner ring, an outer ring and a number of rolling elements between the inner and outer ring,
the sensor arrangement comprising processing means and a plurality of sensors connected to processing means, and the processing means being arranged to execute the method steps according to claim 3.

18. (Previously Presented) Sensor arrangement for determining a contact force vector acting on a rolling element bearing in operation, the rolling element bearing comprising an inner ring, an outer ring and a number of rolling elements between the inner and outer ring,
the sensor arrangement comprising processing means and a plurality of sensors connected to processing means, and the processing means being arranged to execute the method steps according to claim 4.

19. (Previously Presented) Sensor arrangement for determining a contact force vector acting on a rolling element bearing in operation, the rolling element

bearing comprising an inner ring, an outer ring and a number of rolling elements between the inner and outer ring,
the sensor arrangement comprising processing means and a plurality of sensors connected to processing means, and the processing means being arranged to execute the method steps according to claim 5.

20. (Previously Presented) Sensor arrangement for determining a contact force vector acting on a rolling element bearing in operation, the rolling element bearing comprising an inner ring, an outer ring and a number of rolling elements between the inner and outer ring,
the sensor arrangement comprising processing means and a plurality of sensors connected to processing means, and the processing means being arranged to execute the method steps according to claim 6.